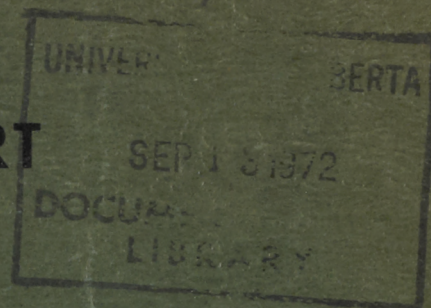


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ANNUAL REPORT
OF THE



EASTERN ROCKIES FOREST

CONSERVATION BOARD

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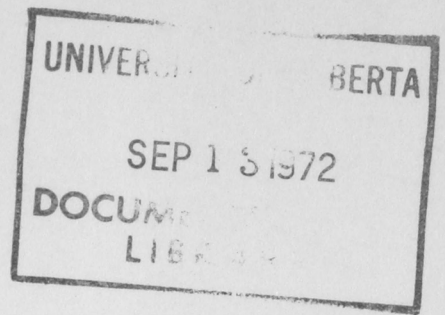
FOR THE
FISCAL YEAR
1971-72

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CALGARY, ALBERTA
1972

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ANNUAL REPORT
OF THE
EASTERN ROCKIES FOREST
CONSERVATION BOARD
FOR THE
FISCAL YEAR
1971-72
CALGARY, ALBERTA
1972

J. R. H. Hall
Chairman

J. R. H. Hall
Chairman

The Honourable Dr. Allan A. Warrack,
Minister of Lands and Forests,
Edmonton.

The Honourable Jack Davis,
Minister of the Environment,
Ottawa.

EASTERN ROCKIES FOREST CONSERVATION BOARD

908, John J. Bowlen Building

620 — 7th Avenue S.W.

Calgary, Alberta

T2P 0Y9

June 15, 1972

Sir:

I have the honour to submit herewith the Annual Report of the Eastern Rockies Forest Conservation Board for the fiscal year 1971-72, pursuant to the provisions of The Eastern Rocky Mountain Forest Conservation Act of 1947.

Respectfully submitted,

J. R. H. Hall
Chairman

The Honourable Jack Davis,
Minister of the Environment,
Ottawa.

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J. R. H. Hall
Chairman

The Honourable Dr. Allan A. Warrack,
Minister of Lands and Forests,
Edmonton.

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**EASTERN ROCKIES FOREST CONSERVATION BOARD
1971-72**

MEMBERS

J. R. H. Hall	Chairman, Edmonton, Alberta
A. T. Baker	Member, Calgary, Alberta
H. W. Beall	Member, Ottawa, Ontario

PRINCIPAL OFFICERS

W. R. Hanson	Chief Forester, Calgary, Alberta
J. P. Hourigan	Secretary, Calgary, Alberta

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“C” — Statement of Revenue from Surface Rights in the Conservation Area.	

INTRODUCTION

The Eastern Rockies Forest Conservation Board was established under authority of "The Eastern Rocky Mountain Forest Conservation Act" which was assented to July 17, 1947, and ratified by an Alberta statute assented to March 31, 1948.

Set out in the Schedule to the Act is an Agreement that was subject to approval by the respective governments and which was to take effect on a date to be agreed upon by the Minister of Mines and Resources of Canada and the Minister of Lands and Mines of Alberta. The effective date of this Agreement was fixed by the respective Ministers as April 1, 1948.

The purpose or objects of the Eastern Rockies Forest Conservation Board are:

- (a) to construct, operate and maintain and to supervise the construction, operation and maintenance of projects and facilities required for the conservation of the forests and the protection of the watersheds in an Area¹ forming part of the Rocky Mountains Forest Reserve as defined in the Agreement;
- (b) to protect the forests in the Area from fire, insects, disease and other damage; and
- (c) to conserve, develop, maintain and manage the forests in the Area with a view to obtaining the greatest possible flow of water in the Saskatchewan River and its tributaries.

The Board's preliminary studies indicated that a policy under the Act of "obtaining the greatest possible flow of water in the Saskatchewan River and its tributaries" would have been dangerous and likely to cause floods and erosion at certain seasons of the year, followed by unacceptably small flow at others. Therefore, the Board's policy has been to manage the Conservation Area for optimum flow.

By inference of the Act, water is the most important product of the Conservation Area and watershed management is, therefore, of primary concern. The Board has adhered to the principle that watershed protection and improvement may be attained along with the utilization of the other resources, hence a policy of managing the Conservation Area on a multiple-use basis has been accepted.

¹ The Conservation Area contains approximately 9,000 square miles on the East Slopes of the Rocky Mountains bounded by the National Parks of Waterton Lakes, Banff and Jasper, and by the Brazeau-Athabasca divide.

In the Agreement drawn up between the two governments the first seven years of the Board's operation were designated the "capital period" and were characterized by a multi-million dollar development program. Following this period the Board handed over the product of its development program to the Alberta Forest Service to administer and operate.

ADMINISTRATION AND MANAGEMENT

1. Eastern Rockies Forest Conservation Board

The Eastern Rockies Forest Conservation Board held five meetings during the fiscal year 1971-72. All of these meetings were held in Calgary, and copies of the minutes were provided to the Minister of the Environment, Ottawa, and the Minister of Lands and Forests, Edmonton. The August, 1971, meeting was followed by a two-day field trip in the Kananaskis, Crowsnest and Oldman River areas by Members of the Board accompanied by the Chief Forester and the Secretary. In the course of the field trip revegetation work was inspected and mining and mineral exploration activities were observed.

During the summer of 1971, Dr. J. D. B. Harrison, who had served as Federal Member since January 1, 1965, tendered his resignation to the Minister of the Environment and he was succeeded by Mr. H. W. Beall, effective from October 14, 1971. Mr. Beall had recently served with the Canadian International Development Agency (C.I.D.A.) and, previously, he had had a lengthy career with the Canadian Forestry Service. Earlier in 1971, Mr. W. R. Hanson, the Board's Chief Forester, reached compulsory retirement age and retired to pension effective February 28. Mr. Hanson was re-hired on a part-year basis to continue as the Board's Chief Forester. Also, during the past year a vacant Technician (Draftsman) position was transferred from the Board to the Alberta Forest Service. This reduces the Board's established positions to a total of five, of which three are filled by members of the Alberta Public Service seconded to the Board.

A "Case Study" was submitted during the year as a Canadian contribution to the United Nations Conference on the Human Environment being held in Stockholm in June, 1972. The case study was prepared by the Board at the invitation of the Canada Department of Fisheries and Forestry. This work, which was entitled "The Conservation of a Watershed — A Case Study", was accepted by the U.N. Secretariat and placed in the conference library.

The writing of a history of the Board has been in progress since September, 1970, and this work was an incidental source for material used in the "Case Study" for the U.N.'s Stockholm conference.

In the year under report the Board made a very significant contribution of data to the Foothills Resource Allocation Study. The Board had been requested to participate on a Water Resources Analysis Sub-Task Force to provide input to the study, which is, over all, an attempt to evaluate and appropriately allocate the resources of Alberta's Rocky Mountain foothills

region. The Board staff spent a considerable amount of time up-dating and preparing hydrometric and meteorologic data for the Conservation Area, which included:

- (1) **Hydrometric Data.** Quartile Analysis for all gauged streams and maps showing area inches of runoff for all stations having annual records, either within or adjacent to the Conservation Area. Additional information was also provided for stations having open water records only; and
- (2) **Meteorologic Data.** Summary of temperature and precipitation information for all stations within or adjacent to the Conservation Area. This included information such as maximum rainfall in a 24-hour period, number of frost free days and so forth.

The existence of commercially held coal leases on the land comprising the Marmot Creek Watershed Research Basin has been a matter of concern to the Board for a number of years, and several meetings have been held and submissions made with a view to finding an escape from this threat. The Board has recently submitted a brief to the Minister of Lands and Forests supporting a request that the research basin be protected from mineral exploration or mining. Another problem, of a lesser degree, facing the Board and co-operating agencies is the damage to scientific instruments in the research basin caused by vandalism. To relieve this problem action is being taken through the Alberta Forest Service for the development of adequate anti-trespass regulations to be formulated under the Forest Reserves Act.

In January, 1972, the Board prepared and submitted to the Minister of Lands and Forests a paper entitled "A Report to the Minister of Lands and Forests Concerning the Conservation of the East Slopes Watershed in Alberta". The Board attaches great significance to this report, which summarizes its activities for the past 24 years and indicates the further action needed to ensure the continuity of safeguards for the East Slopes watershed.

Expenditures for maintenance and administration of the Conservation Area including the expense of the Board, financed by the Province of Alberta in accordance with Section 2(a)(ii) of a Memorandum of Agreement made June 17, 1952, between the Government of Canada and the Government of the Province of Alberta, amounted to \$1,173,444.28 for the fiscal year under review. A financial statement appears at Appendix "B". A detailed statement of revenue from surface rights within the Conservation Area for the year ended March 31, 1972, is shown at Appendix "C".

ADMINISTRATION AND MANAGEMENT

2. Alberta Forest Service

The Alberta Forest Service, as a Division of the Department of Lands and Forests, administers the Conservation Area along with other forest lands of the Province. The following is the report of their activities in administration and management.

TIMBER MANAGEMENT

During the past year a decision was taken to defer indefinitely any consideration of proposals related to the establishment of a pulp-mill based on timber supplies located in the Conservation Area.

While the production of lumber and lath declined from the previous year by almost 25 per cent, the production of round timber (posts, rails and poles) increased slightly. Total forest products production declined from 11,085 thousand cubic feet in 1970-71 to 8,344 thousand cubic feet in the fiscal year under report. As the sustainable and authorized level of quota production was 16,197 thousand cubic feet at March 31, 1971, quota utilization is currently averaging about 50 per cent of authorized levels.

In spite of relatively low levels of production, the trend toward larger holdings and centralized manufacturing plants has continued. There has also been an encouraging trend towards multi-product operations (lumber and roundwood from the same stand) based on close utilization down to a five-inch stump.

Watershed management, recreation and other land uses are receiving increasing emphasis each year in the planning and supervision of timber operations and extraction roads. The salvage of timber in the area to be submerged behind the Bighorn dam (to be known as Abraham Lake) has been largely completed as well as the timber salvage licence for the Brazeau reservoir.

Weight scaling systems of timber measurement have been adopted by Spray Lakes Sawmills and Coleman Collieries during the past year by the installation of weight scales.

Reforestation and Stand Improvement

Reforestation and stand improvement work by the Alberta Forest Service in the Conservation Area is summarized in the following table:

Forest	Scarified Acres	Seeded Acres	Seedlings Planted		Thinned Acres	Cones Collected Bushels
			Conventional	Container		
Crowsnest	336	54	115,350	—	35	670.4
Bow River	748	—	214,075	73,860	—	6,706.0
Clearwater- Rocky	584	693	122,000	174,663	318	164.8

(The seed production areas have been established in the Bow River Forest.)

Reforestation and stand improvement work by quota holders in the Conservation Area is summarized in the following table:

Forest	Scarified Acres	Seeded Acres	Seedlings Planted		Cone Collection
			Conventional	Container	
Crowsnest	—	—	—	—	—
Bow River	250	—	—	—	—
Clearwater- Rocky	200	—	—	—	—

Timber Quotas

The first five-year periodic cut control expired on April 30, 1971. As a result of failure to produce the required 40 per cent of the authorized quota volume several quotas were cancelled, thereby reducing the total authorized quota production from 18,436 thousand cubic feet at the end of the previous fiscal year to 16,197 thousand cubic feet at April 30, 1971. The following table summarizes quota development and changes in the Conservation Area:

Coniferous Timber Quotas

	Crowsnest Forest	Bow River Forest	Clearwater- Rocky *	Total Conservation Area
Number of Quotas May 1, 1966	13	23	34	70
Number of Quotas sold since May 1/66	1	12	—	13
Number of Quotas merged since May 1/66	3	13	4	20
Number of Quotas cancelled since May 1/66	1	6	6	13
Current number of quotas	10	16	33	59
Current Annual Cut auth. by Quotas MCF	5,280	4,580	6,337	16,197
Allowable Annual Cut	7,659	19,994	38,600	66,253
Quota cut as % of Allowable Cut	69	23	16	24 (av.)

(* Includes E11 Management Unit although this unit has been deleted from the Conservation Area and added to the Edson Forest.)

In 1971-72, the R1, R2, R3 and R9 Management Plans were revised and approved. Up-dating the management planning in the Conservation Area is proceeding steadily.

Timber Production

Statistics on timber licences, timber permits and production of lumber and related products in the Conservation Area as reported by the Alberta Forest Service for the year under review are listed hereunder:

1. Number of Timber Quota Certificates Offered for Sale	—
2. Quota Volume Offered for Sale	—
3. Number of Timber Licences Granted to quota Holders	5
4. Volume of Timber Granted to Quota Holders Coniferous	8,250,304 cu. ft.
5. Number of Timber Licences Offered for Sale	2
6. Volume of Timber Sold by Licence-Coniferous	272,000 cu. ft.
7. Number of Salvage Timber Licences Granted	—
8. Volume of Salvage Timber Granted	—
9. Number of Special Timber Permits Issued	6
10. Volume of Timber Sold by Special Timber Permit —Coniferous	91,294 cu. ft.
11. Number of Miscellaneous Timber Permits Issued	260
12. Number of Active Timber Licences	58
13. Number of Special Timber Permits	19
Production of Lumber and Related Products:	
— Lumber	43,618,929 FBM
— Plywood logs, coniferous	10,000 FBM
— Railway Ties	—
— Round Timber	476,643.4 cu. ft.
— Lath	429,200 Pieces
— Slabs and Fuelwood	733.5 Cords
— Christmas Trees	4,879
— Trees for Transplanting	135

FOREST LAND USE

Watershed Management

The principles of watershed management were applied during the year in considering applications, chiefly from industry, for land use in the Conservation Area. A new referral system was adopted whereby proposed highway locations on public lands would include consideration of watershed management in addition to the other factors. Progress was made during the year in the development of general road standard guidelines for forested areas in Alberta.

A problem analysis survey of mined land reclamation was completed and reports for use by both industry and research have been prepared.

In the work of watershed research and restoration, trials were made of aerial seeding and fertilizing of burned over areas resulting from the North Burnt Timber Creek fire in 1970. Representative one-acre plots were set up on "high" to "severe" burned sites according to aspect and slope. Runoff plots a milacre in size were installed within most of the one-acre aerial plots to measure the degree of success in revegetation.

About 800 miles of abandoned forestry trails, seismic lines and trunk road received attention for the purpose of watershed restoration in the Conservation Area. This involved a large amount of cross-ditching on the seismic lines and trails and seeding of denuded areas, back slopes and so forth. The restoration work also included clean-up and levelling of old mill-sites and repair by the operating companies of coal drill-sites and other scars from coal exploitation. Students in the 1971 summer employment Ecology Corps Program were employed in cross-ditching fire control lines constructed during the Burnt Timber fire.

Geophysical Exploration Gas and Oil Development

There was a sharp decline in the 1971-72 fiscal year in the amount of geophysical exploration in the Conservation Area. Only 43 seismic programs were approved; approximately 600 miles of new seismic lines were constructed. Oil and gas development, however, remained fairly constant in the Crowsnest and Bow River forests, but declined slightly in the Clearwater-Rocky forest. The following table shows total producers, wells drilled and abandonments in 1971-72:

Forest	Total Producing Wells 1971-72	Wells Drilled 1971-72	Wells Abandoned 1971-72
Crowsnest	32	3	1
Bow River	36	12	9
Clearwater- Rocky	30	11	3
	<hr/> 98	<hr/> 26	<hr/> 13

Coal Exploration

Coal exploration activities within the Conservation Area remained constant. Approval was granted during the year for 23 coal exploration programs. The activity is mainly confined to potential coking coal outcrops, while some interest was shown in steam coal outcrops near Nordegg. There was no exploration for other minerals such as quartz or copper in the Area during the past fiscal year.

Recreational Planning

During 1971-72, four Recreation Area site plans were approved by the Board. "Oldman River" in the Crowsnest Forest and "Goldeye Lake" recreation area in the Clearwater-Rocky forest were existing areas which were upgraded during the year. "Castle Falls" in the Crowsnest and "Peppers Lake" in the Bow River forest are new recreation areas being developed by the Alberta Forest Service. Work continued in the three forests in improving and adding facilities to the existing recreation areas to meet the ever increasing use.

A total of 32 Recreation Area plans have been approved with facilities to accommodate 520 picnic units, 403 tent units and 272 trailer units. An updated summary of Board approved Recreation Area site plans indicating facilities and services is shown as Appendix "A".

The freeze imposed on all types of recreational dispositions within the Conservation Area pending completion of the Foothills Resource Allocation Study was continued through 1971-72.

Multiple Use Planning

The Foothills Resource Allocation Study was described in the Board's previous Annual Report. This study is advancing favourably into the data analysis stages.

The details of the four phases have been revised and most of the details are now finalized. Work has begun on re-writing the methodology report, previously prepared in preliminary form only.

Data coding for the southern Alberta foothills is nearing completion (using Priority Employment Plan clerical staff) and many of the computer programming techniques have been designed and written. In spite of difficulties experienced in recruiting economists, considerable work has been done on the timber, recreation and agriculture sectors of the economic analysis.

Plans will be prepared in report form for each of the phases beginning with the Phase 1 report for the Kananaskis-Spray watershed. Subsequent reports are scheduled on an ongoing basis with completion of the entire program slated for March 31, 1973.

The terms of reference for the Study have been adjusted due to several factors. The area included for analysis has been enlarged to approximately twice the original; the details of the analysis have been altered to include more information than initially suggested and the expertise required to do the work has been difficult to acquire and retain on temporary assignments. The result has been a one year extension of the Study and additional funding provided for out of the Provincial budget. The federal government funded the first two years under the Canada Land Inventory program.

Grazing

The weather in the Conservation Area during the year under report was somewhat varied resulting in each forest having a different forage growth pattern. The Crowsnest Forest reported excellent early spring growth but this early advantage was wiped out by the dry, hot summer and below normal forage yields resulted. The Bow River Forest experienced a spring of above normal precipitation and below normal temperatures which slowed early growth. A dry, hot summer further reduced growth so that the forage yields were well below normal. The Clearwater-Rocky Forest experienced spring conditions similar to those of the Bow River but normal summer precipitation resulted in forage yields very close to the long term average.

The actual use for 1971 was 81,066 animal unit months compared with 84,719 for 1970.

Grazing revenue for the year amounted to \$72,292 for 265 permits on 88 allotments not including those allotments which were unused. Grazing fees were one dollar per Animal Unit Month (A.U.M.) in the Porcupine District and eighty cents per A.U.M. in the remainder of the Conservation Area.

Range Conditions

The Crowsnest Forest reported "good" conditions with some prime areas falling into a "fair" category. This was attributed to distribution in most cases. The "poor" condition sites were limited to areas of natural congregation. An increase in pocket gophers and ground squirrels on the "fair" and "poor" condition sites was noted.

The Bow River Forest range condition was generally good at the close of the 1971 grazing season. Conditions in the Sheep District were only "fair" due mainly to three consecutive drought years in that area. "Poor" condition range was generally restricted to natural congregation areas, excepting a portion of the Fish Creek allotment along the river flats, this being over-utilized due to poor management.

The Clearwater-Rocky Forest range condition was generally "good" showing improvement in some areas while others regressed to "fair". Areas of "poor" and "fair" condition are attributed to lack of riding, with consequent poor distribution. This was especially evident in allotments with a preponderance of woodland ranges.

Grazing Statistics

The following grazing records for 1971 show the number of livestock grazed under permit and the revenues obtained from grazing. There were no sheep grazed under permit during the year:

Forest	Grazed Under Permit			Grazing Permits Issued	Actual in	
	Yearling Cattle	Mature & Bulls Cattle	Horses		A.U.Ms.*	Revenue
Crowsnest	8,233	6,821	—	171 cattle	45,086	\$41,973
Bow River	1,967	6,579	192	76 cattle 4 horses	32,632	26,939
Clearwater- Rocky	192	825	47	12 cattle 2 horses	3,348	3,380
	<u>10,392</u>	<u>14,225</u>	<u>239</u>	<u>265</u>	<u>81,066</u>	<u>\$72,292</u>

(Note: * Include animals under permit plus known outfitter and rider horses not under permit.)

SUMMARY

	1970	1971
Revenue	\$74,240	\$72,292
Number of Livestock	25,048	24,856
Number of Allotments	91	88*
Number of Permits	270	265**
Average permits per allotment	3	3
Average livestock per allotment	275	282
Average livestock per permit	93	94
Average revenue per permit	\$ 274	\$ 272
Average revenue per allotment	\$ 815	\$ 821

(Notes: * Allotments with non-use permits in 1971 not included.

** Non-use permits in 1971 not included.)

Livestock Losses

The recorded livestock losses for 1971 of 0.56% are somewhat below the long term average. All of the livestock thefts in the period occurred in the general area of the Highwood and Sheep districts. Following is a summary of livestock losses:

Causes of Loss	Numbers Lost	
	1970	1971
Poisonous Plants	11	26
Predators	4	1
Lightning	2	8
Hunters	4	—
Automobiles	3	3
Natural or Unknown	113	74
Theft, Missing, Strayed	34	26
	<hr/> 171	<hr/> 138

Division of Range

Crowsnest Forest. The Wilding quarter is now included in the Sharples Creek allotment in exchange for 240 acres which have been excluded from the King Pasture Distribution Unit of this allotment. Daisy Creek allotment has become part of the Gap allotment. Each drainage will be managed as an individual distribution unit. Following the 1971 grazing season, domestic livestock use has been permanently discontinued from the Nez Perce

drainage, as this is the source of water for the town of Coleman. An area in the southwest portion of the Mill Creek allotment has been included in the Southend allotment. Better utilization can be made of this area there, as it is virtually inaccessible from Mill Creek.

Bow River Forest. In the division of range in the Bow River Forest, Cataract Creek allotment was closed for one year to give the range a rest. The allotment will be grazed only by yearlings in the future. The Coxhill Creek Distribution Unit in the Jumping Pound allotment has been closed to grazing due to recent silvicultural work.

Clearwater-Rocky Forest. The anticipated closure of the Saunders Range allotment has not come about, as the Department of Highways has not finished construction of the proposed highway.

Range Improvements

Crowsnest Forest. Improvements completed during the year included two spring-and-trough water developments. The forest boundary was fenced in the Sharples Creek allotment and also in the Pincher Creek Distribution Unit of the Southend allotment. A new drift fence was also erected in the Southend allotment on Drywood (Carpenter) Creek. In the West Trout allotment, old mill-sites, seismic lines and oil well sites were reseeded. The McGillivray Creek flats were sprayed with Tardon in an effort to eradicate the weedy annual forbs found there.

Bow River Forest. A new drift fence was built in the Grease Creek allotment. It is expected that this fence will greatly aid in distribution of livestock within this allotment. Scabiosa was sprayed in the Jumping Pound allotment, 150 acres of dandelions were sprayed in the North Sheep allotment and several small patches of larkspur were sprayed in the Fish Creek allotment.

Clearwater-Rocky Forest. No range improvement projects were carried out in the Clearwater-Rocky Forest but several are under consideration for next year.

Game Protection

Crowsnest Forest. The Fish and Wildlife Division of the Department of Lands and Forests has been conducting a "Co-operative Forage Resources Study" since 1968. Former allotments closed to grazing in favour of wildlife habitat protection and watershed protection include the Glacier Creek and York-Sentry allotments. Grazing has now been terminated on the Gladstone Creek allotment for the same reason.

Bow River Forest. Areas closed to domestic livestock grazing in the Bow River Forest include:

1. Kananaskis District;
2. Ya-Ha-Tinda area with the exception of Federal Crown Land;
3. Upper areas of the Waiparous, Ghost, Fallentimber and Burnt Timber watersheds;
4. Ghost Wilderness Area;
5. Sheep Creek and portions of Wigwam and Fisher creeks in the Red Deer District;
6. Eagle Creek watershed; and
7. Upper Sheep Distribution Unit in the South Sheep allotment.

Other areas in the Bow River Forest where there appears to be conflict are under study for either a reduction in numbers of livestock or closure to domestic livestock.

Clearwater-Rocky Forest. No serious competition between livestock and game was reported in any of the allotments in the Clearwater-Rocky Forest. All allotments in this forest are only stocked to 50% of their calculated carrying capacity as a game habitat protection measure.

Range Survey

The following five range allotments were surveyed in 1971:

Crowsnest Forest	—	Burke Creek
Bow River Forest	—	Upper Red Deer and Lower Red Deer
Clearwater-Rocky Forest	—	Elk-Idlewilde and Seven Mile Cutoff

Miscellaneous Forest Land Use Activities

The position of Oil Spill Control Specialist with the Forest Land Use Branch, in the Alberta Forest Service, was filled in 1971. The responsibility of this position is to plan and develop within the Alberta Forest Service a procedure for oil spill control. The incumbent works with the oil industry, and with other government agencies, to co-ordinate the Alberta Forest Service's Oil Spill Control Plan with overall provincial contingency plans. In the Conservation Area, the oil spill hazard is confined to the northern portion where some oil production and oil pipelines are located.

A "Recreational Highway Access Development Study in the Kananaskis Area" was initiated using the services of the resources consulting firm of Lombard North Planning, Ltd. This was a co-operative project with the Department of Highways and Transport to study the recreational potential of the Kananaskis area in relation to highway development.

CONSTRUCTION AND MAINTENANCE

The following forestry road bridge construction was done during the past year:

Crowsnest Forest

A 50-foot concrete bridge was erected over Daisy Creek on the Forestry Trunk Road, replacing a timber structure.

The Allison Creek bridge was replaced using material salvaged from the Daisy Creek bridge.

Clearwater-Rocky Forest

A 50-foot concrete bridge was constructed across Brown Creek on the Forestry Trunk Road, replacing a timber structure.

Prairie Creek Bridge No. 2 on the Prairie Creek road was widened six feet by the Aquitaine Company of Canada Ltd., to accommodate increased traffic to their sulphur plant.

Prairie Creek Ranger Station Bridge — new abutments constructed and a concrete deck installed.

FIRE PROTECTION

A total of 72 fires were recorded in the Conservation Area in 1971, one more than in the preceding year; but the area burned amounted to only 398 acres compared to 1970's 4,483 acres.

Fires by Cause	Total Fires		Per Cent	
	1970	1971	1970	1971
Lightning	26	43	36.6	59.7
Recreation	19	17	26.8	23.6
Public Projects	10	2	14.0	2.8
Other Industries	6	1	8.5	1.4
Forest Industries	5	8	7.1	11.1
Unclassified	2	1	2.8	1.4
Unknown	2	—	2.8	—
Incendiary	1	—	1.4	—
	<u>71</u>	<u>72</u>	<u>100.0</u>	<u>100.0</u>

Fires by Forest	Number	Acres Burned
Crowsnest	7	36
Bow River	43	70
Clearwater-Rocky	22	292
	<hr/> 72	<hr/> 398

RESEARCH IN THE CONSERVATION AREA

1. Eastern Rockies Forest Conservation Board

The Board is involved in research on its own and as a co-operator in the Alberta Watershed Research Program. The Chief Forester and the Forester in charge of research are members of the Steering Committee and the Research Co-ordinating Committee, respectively, of the Watershed Research Program. Advice and assistance were given in several projects. Board staff directed or carried out several projects within the Watershed Research Program or in order to meet its own needs.

West Castle Project

The study site for this project is in the headwaters of the West Castle River, in the Crowsnest Forest, and is at an elevation of about 6,300 feet contiguous to the Continental Divide. The project was originated in 1967 to assess the effect which cut-strips, 132 feet wide, in old-growth Engelmann spruce would have on snow accumulation and melt. The cut-strips were arranged in an alternate pattern with a 330 foot leave strip in between. The cut-strips vary in length from 330 feet to 1,452 feet, and are oriented in an east-west direction. The area of the cut-strips totals 23.5 acres with 22 acres of right-of-way joining the strips.

One year after the study commenced a spruce bark beetle infestation was observed to be on the increase and the mortality rate in the residual timber began to rise. This misfortune greatly reduced the canopy density and edge effect of the cut-strips. Timber salvaging was conducted in the years 1969, 1970 and 1971. It was observed that, following the initial salvage operation, the cut-strips still had greater snow accumulation than the residual stand, despite the reduction in canopy density and edge effect.

The final assessment and report on this project will be made during 1972.

Plateau Mountain Project

The objective of this study is to demonstrate and observe induced snow accumulation using snow fences at high elevation, and to measure the progress of the subsequent melting of the drifts. The structural design is basically A-frame with two vertical sections of standard 50 per cent density snow fence between each A-frame. Initially, the total length (590 feet) consisted of three fence units spaced along an exposed ridge (elevation 7600 feet) of Plateau Mountain, in the Crowsnest Forest, and oriented at right-

angles to the prevailing southwesterly winds. The A-frames are well anchored because of wind speeds which exceed 100 miles per hour.

The 1971-72 winter accumulation appears to be the maximum recorded to date. The normal snowpack in the general area usually disappears by mid-May. The drifted snow, however, remains until late June or early July, but this year (1972) it is likely to remain until mid-July.

Data have been collected since 1965 and final observations and measurements will be completed in the summer of 1972, and the snow fence structure will then be dismantled. A final report on the project will be published.

Swan Hills Project

The Board's participation in this project has been at the invitation of the Alberta Forest Service.

The discovery of oil in the Swan Hills in 1957 opened up a virtually undisturbed forested area. Within a short time about 300 square miles was bisected with seismic lines, roads and trails, pipelines and powerlines serving about 900 wellsites. A survey showed that about 12 to 18 per cent of the land area of some townships had been cleared.

A severe erosion and sedimentation problem arose because of the area's highly erosive soils, steep topography, intense rainfall and poor engineering practices. This led the Alberta Forest Service in 1967 to initiate an applied research project in which the Board was to co-operate. The action program consisted of four phases:

1. An inventory of existing watershed damage and conditions in the Swan Hill oilfield;
2. Measurement of precipitation, erosion and runoff;
3. Suspended sediment sampling in streams; and
4. Revegetation trials and plot studies.

It was agreed that the Eastern Rockies Forest Conservation Board would handle phases 2 and 3.

Four erosion-runoff plots, each 160 square feet in area and on different soil types, were set up and maintained from 1967 through 1971. The runoff and soil losses from each plot were collected in barrels for analysis, both on a storm event and seasonal basis.

During the last year a site evaluation and field inspection of the gauge stations was conducted. A computer analysis of all of the data revealed that

Rainfall intensity was measured at each plot from 1967 through 1969. The meteorologic network also included four snow courses and four Sacramento-type storage gauges.

In 1968 a suspended sediment program was initiated on the Swan River at Kinuso.

Two examples of results from these various measurement stations are as follows:

- A. 1. Storm Event – September 2-5, 1969;
 2. Average precipitation (4 plots) – 3.5 inches;
 3. Average Soil loss from four plots – 10 tons per acre;
 4. Suspended sediment load at Kinuso rose from 15 tons per day on September 2 to 19,300 tons per day on September 6 (mean discharge – 5,400 c.f.s.)
- B. 1. Storm Event – June 30 to July 3, 1971;
 2. This storm event was preceded by over 3" of rainfall within a week. During the storm one station reported 3.91 inches of precipitation in one day.
 3. Soil loss from plots was not measured on a storm event basis in 1971;
 4. Suspended sediment load at Kinuso reached 80,300 tons per day on July 4 with a mean discharge of 11,400 c.f.s.

The Board's active participation in the project was concluded in 1971 but it continues to lend support to operation of the precipitation network and the suspended sediment sampling program which is being conducted by personnel from the Kinuso Ranger Station, Slave Lake Forest.

Snow Pillow

In 1969 the Board installed the first snow pillow in Alberta. The installation is in the Marmot Creek Watershed Research Basin.

The 10-foot diameter butyl rubber pillow, filled with methyl-alcohol and water, is a pressure sensing device which measures the water equivalent of snow. An accurate trace of snow accumulation and ablation is kept by a continuous recorder. Besides complementing the other meteorologic and hydrometric records in the research basin, the snow pillow is a useful tool for gaining a better understanding of snow hydrology. The winter of 1971-72 produced the highest record of water equivalent since the installation was made.

Timber Harvesting Plan and Logging Road Construction in Marmot Basin

The Marmot Creek Watershed Research Basin has been studied and described for 10 years with an objective of evaluating the effects of a commercial timber harvest on specific hydrologic parameters. It was agreed by the participating organizations to proceed with the construction in 1971 of a road network which would service the eventual logging of the Cabin Creek sub-basin.

Field supervision of the logging road construction was provided jointly by the Board and the Northern Forest Research Centre of the Canadian Forestry Service. Funding was provided by the Alberta Forest Service. Nearly two miles of new road were constructed and two and a half miles of existing road were up-graded. This work was done during September 1971, and during the following winter the Alberta Forest Service disposed of the major portion of the slash that had been piled or windrowed. The intensive supervision coupled with capable equipment operators produced a logging road of a standard which exceeded expectations.

During 1972 the road drainage layout will be observed and suspended sediment loads and water quality will be monitored to detect possible changes due solely to the new logging roads.

Precipitation Storage Gauge Network

Because of a virtually complete absence of precipitation data for the Area at the Board's inception, a precipitation gauge network was established. The first gauges of the original 100-gauge network were installed in the fall of 1952. Initially, the gauges were mounted on wooden stands, recharged with a calcium chloride solution and readings were taken with a hook gauge and rule. The gauges originally were fitted with a collar (orifice) which had to be removed in order to take a measurement. Subsequent modifications to the equipment have resulted in replacement of the removable collar with a permanent brass orifice, use of glycol anti-freeze in place of the calcium chloride solution, and measurement with a rule that reads directly in inches of precipitation.

During the past year all the records gathered on the network were checked and transferred to data processing cards. These data are summarized at the end of the year for calculation of seasonal and annual means, differences from normal, high and low values and so forth. A series of regression equations has been developed for estimating missing data.

During the past year a site evaluation and field inspection of the gauge stations was conducted. A computer analysis of all of the data revealed that

a number of stations had good correlations and sufficient years of record. Thus, in conjunction with the field data and correlation analysis, a number of stations were found redundant. Consequently, 40 per cent of the gauges located south of the Bow River were discontinued, and the remaining stations were refurbished. All of the stations that now remain south of the Bow River can be considered permanent locations. With the co-operation of the Alberta Forest Service, the gauges at all of these stations are now on metal stands, imbedded in concrete. Worn and damaged parts have been replaced, new sash chain installed on the windshields, and the gauges painted.

The Board arranged manufacture of a supply of new metal stands during the winter and the remainder of the precipitation gauge network, located north of the Bow River, will be similarly refurbished during 1972.

The precipitation gauge network continues to yield valuable climatic information. The data have been incorporated in the Board's Conservation Unit Guides, and, also, these data are extremely valuable to Water Survey of Canada for use in flow forecasting.

This project has proved to be of far greater worth than originally envisaged, and the data that have been gathered are much sought after by other agencies, consultants and university students.

Foothills Water Quality Study

This project is a co-operative study under the Alberta Watershed Research Program with the Board Providing the co-ordination, direction and other assistance.

An intensive suspended sediment sampling program was conducted in the Threepoint and Ware Creek drainage, in the Bow River Forest, during one major storm event in June 1971. Very good sample coverage was obtained and the results, when compared with the 1970 data, yielded some statistically significant differences. It is likely that another storm event will be covered in 1972.

2. Canadian Forestry Service

In the Memorandum of Agreement contained in the "Eastern Rocky Mountain Forest Conservation Act" the Board is empowered to make arrangements with other agencies for the undertaking of research and other scientific investigations. The Board has received generous support and assistance over the years from the Canadian Forestry Service, and a report of their work for the year under review is outlined hereunder.

Forest Hydrology

The Canadian Forestry Service continued as a member of the inter-agency Alberta Watershed Research Program by supplying the services of the Research Co-ordinator, four professional and five support positions.

A water quality sampling model was tested for a second and final season in the anticipated coal lease area of the Elbow and Sheep watersheds southwest of Calgary. Four Canadian Forestry Service personnel and a vehicle were maintained on a standby basis through May and June. One storm was sampled. Preliminary indications are that intense sampling (intervals of two or three hours) in the early hours of a storm on a few (probably less than five) watersheds will yield statistically significant results. This is in sharp contrast to the results from six-hour interval sampling which requires 16 watersheds for comparable results. A joint publication by Eastern Rockies Forest Conservation Board and Canadian Forestry Service research personnel is planned.

Snow distribution patterns, the main parameter being evaluated by the Canadian Forestry Service, are expected to be modified by the commercial harvest test on Marmot. The completion of the haul roads in 1971 brings the commercial harvest time goal of 1973 much closer to fruition. Results of three years snow distribution indicate that snow accumulation on the area to be harvested in Cabin Creek sub-basin is predictable from similar measurement on Twin Creek sub-basin. Distribution measurements will continue for at least three to five years after harvest.

Timber cover manipulation to create desirable snow accumulation-melt regimes is the ultimate goal of the watershed manager. Controlled studies followed by controlled tests are necessary for successful demonstration. In the James River area, northwest of Sundre, a 10 x 10 Latin square design of circular openings ranging from one-fourth to six tree heights in diameter has been developed. Most of the slash has been disposed of. Five weather stations (Hygrothermograph, recording precipitation gauge, totalizing anemometer, and direction vane at 10 meters above canopy) have been established to ascertain the "climate" of this particular area for comparison

with others to which the results might be applied. The first snow accumulation-melt data are expected in March-April 1973. This will be a necessary input for a manipulation model for test on Marmot Twin sub-basin in the near future (1976?).

In situ transpiration measurements became a real possibility through experiments at the Kananaskis Forest Experiment Station in the past three years. The heat pulse velocity measuring system can estimate the absolute hourly or daily transpiration by any one tree within ± 20 percent, and careful sampling techniques may reduce this to within ± 10 percent between sites by sampling as few as five trees on each site. The instrumentation to evaluate aspect-elevation differences in transpiration has been installed on Marmot Twin sub-basin. At present, this technique requires manual observation which limits the usefulness of the approach in basin research. However, recording techniques are being investigated.

Silviculture

Regeneration studies in association with prescribed burning described last year were continued. A report on preliminary results is being prepared. The field trials of types of container seedlings will be completed in 1972. Seedlings planted without containers but with their rooting medium ("plugs") have given best results. Mortality due to autumn drought has been high in all types.

Trials of strip thinning in dense, young lodgepole pine stands have shown increased diameter growth in all size classes of trees remaining, especially dominants. This technique has much promise and trials will be continued.

A trial of British Columbia/Canadian Forestry Service styroblock seedlings and Alberta Research Council "sausage" seedlings was established in the Bow River Forest near the Red Deer Ranger Station. This three-acre planting trial will be continued for two years, and survival and growth measurements recorded one, three and five years after planting.

Kananaskis Forest Experiment Station

In the fiscal year 1971-72, approximately 220 acres of mature lodgepole pine stands were clear-cut on the Kananaskis Forest Experiment Station. The total cutover area is now approximately 320 acres. Size of the cut blocks ranges from five acres to 70 acres. Blocks recently laid out for cutting do not exceed five chains in width and are not larger than 20 acres.

During the year, 150 acres were scarified to obtain immediate regeneration. About 8000 container-grown seedlings were handplanted on an area of nine acres. Permanent regeneration check plots were established on areas previously scarified.

Road work comprised the construction of 1.5 miles of new haul road, the repair of unpassable protection roads, and the regular maintenance of secondary roads.

Forest Insect and Disease Conditions

The spruce beetle still constitutes a threat to the mature and overmature spruce in the Crowsnest Forest. Re-examination of plots established in several areas, along Bunny Creek, North Racehorse Creek, and upper Dutch Creek, showed a slight increase in the number of attacked trees although the overall infestation remained low.

A complex of defoliators caused spotty, light to severe defoliation of aspen along the foothills from the Porcupine Hills north to the North Saskatchewan River. The large aspen tortrix caused moderate to severe defoliation along the north end of the Porcupine Hills, west of Calgary and in the Rocky Mountain House area. Spruce spanworm was responsible for moderate to severe damage in Streeter Basin and in the area of the Morley Indian Reserve. The forest tent caterpillar caused light defoliation around Rocky Mountain House.

Moderate infections of spruce by needle rusts occurred in two areas of southwest Alberta: along the Clearwater River near the east boundary of the Forest Reserve and in the vicinity of Eau Clair compsite in the Kananaskis Valley.

Climatic damage to conifers, "red belt", was severe in patches along the east slopes of the mountains from Waterton Lakes National Park north to the North Saskatchewan River.

Winter injury to aspen was evident in small areas throughout the Conservation Area but most trees had leafed out by mid-July indicating that damage was not severe. In stands southwest of Sundre, however, trees sustained permanent injury to branch and winter buds and many trees subsequently died.

Forest Fire Research

The three-year fire behaviour program at the Kananaskis Forest Experiment Station is now completed. A total of 20 one-acre experimental burns, and five hazard reduction burns were conducted during 1969, 1970, and 1971 in the lodgepole pine slash type. Fire spread and impact were related to components of the Canadian Fire Weather Index as a means of predicting daily fire hazard. Results will be presented as a supplement to the Canadian Forest Fire Behaviour Rating System which is aimed at providing an accurate prediction of fire behaviour in major fuel types.

Appendix "A"

E.R.C.B. Annual Report 1971-72

RECREATION AREA

Facilities and Services

Board Approved Recreation Area Site Plans	Facilities and Services			Boat Launching	Developed water well	Wood Supply	Caretaker Services	Weekly Cleanup Inspection	Shelter
	Picnic Section	Tent Section	Trailer Section						
Ram Falls	50	30	20	—	x	x	x	—	x
Fish Lake	20	11	19	x	x	x	x	—	x
Upper Shunda Cree	20	15	5	—	x	x	—	x	—
Eau Claire	10	8	20	—	x	x	—	x	x
Cat Creek	8	10	13	—	x	x	—	x	x
Cataract Creek	10	10	—	—	x	x	—	x	x
Burnt Timber	10	10	8	—	x	x	—	x	—
Gooseberry Flat	30	10	9	—	x	x	—	x	—
Kananaskis Lakes	—	18	—	x	x	x	—	x	—
Beaver Flat	36	10	8	—	x	x	—	x	x
Spray Lakes	—	21	—	x	x	x	—	x	—
Red Deer River	12	15	20	—	x	x	—	x	x
Livingstone Falls	40	12	4	—	x	x	—	x	x
Racehorse	40	10	6	—	x	x	—	x	x
Lynx Creek	20	10	6	—	x	x	—	x	—
Wiparous Creek	10	18	18	—	x	x	x	—	x
James Wilson	10	5	10	—	x	x	—	x	x
North Ram River	10	10	—	—	x	x	—	x	—
Chinook	—	19	12	x	x	x	—	x	x
Deer Creek	10	—	—	—	—	x	—	x	x
Dutch Creek	20	16	8	—	x	x	—	x	x
Seven Mile	10	10	8	—	x	x	—	x	x
Prairie Creek	10	10	10	—	x	x	—	x	x
Allison	10	9	8	—	x	x	—	x	x
Indian Grave	10	9	9	—	x	x	—	x	x
Blue Rock	10	13	—	—	x	x	—	x	—
Beaver Mines Lake	50	30	20	x	x	x	—	x	—
Sibbald Flat +	18	14	14	x	x	x	—	x	x
Castle Falls	10	12	6	—	x	x	—	x	—
Oldman River *	24	10	—	—	x	x	—	x	x
Goldeye Lake	—	8	5	x	x	x	—	x	—
Peppers Lake	10	10	6	x	x	x	—	x	—
	528	403	272						

+ Combines areas formerly known as Sibbald Lake and Sibbald Park

* Group Camping facilities also provided (24)

x Facilities provided free

GOVERNMENT OF THE PROVINCE OF ALBERTA

OFFICE OF THE PROVINCIAL AUDITOR

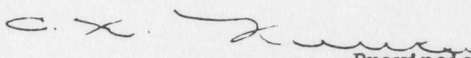
EDMONTON,

May 30, 1972

Eastern Rockies Forest Conservation Board
CALGARY, Alberta

I have examined the Balance Sheet of the Eastern Rockies Forest Conservation Board as at March 31, 1972, and the Statements of Maintenance Expenditure and Government of Canada and Government of the Province of Alberta Equity for the year then ended. My examination included a general review of the accounting procedures and such tests of the accounting records and other supporting evidence as I considered necessary in the circumstances.

In my opinion these financial statements present fairly the financial position of the Board as at March 31, 1972, and its maintenance expenditure for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

 F. C. A.
Provincial Auditor.

RECREATION AREA

May 30, 1972

EDMONTON

Facilities and Services

EASTERN ROCKIES FOREST CONSERVATION BOARDBALANCE SHEET *AS AT MARCH 31, 1972ASSETS

Workmen's Compensation Board deposit	\$	5,154.25
Value of loose tools and equipment transferred to the Province of Alberta as at April 1, 1959		173,496.38
Capital improvements and works		<u>5,716,615.20</u>
	\$	<u>5,895,265.83</u>

LIABILITIES

Government of Canada and Government of the Province of Alberta equity, Statement C	\$	<u>5,895,265.83</u>
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* Notes 1 and 2

The accompanying notes are part
of these financial statements.

This is the Balance Sheet referred to in my
report of May 30, 1972, addressed to the
Eastern Rockies Forest Conservation Board.

F. C. A.
Provincial Auditor.

+ Combined area formerly known as Sibbald Lake and Sibbald Park.
* Group Camping facilities also provided (24)
x Facilities provided free

Statement CEASTERN ROCKIES FOREST CONSERVATION BOARDSTATEMENT OF GOVERNMENT OF CANADA AND GOVERNMENT
OF THE PROVINCE OF ALBERTA EQUITYFOR THE YEAR ENDED MARCH 31, 1972

Balance as at March 31, 1971	\$ 5,895,641.78
Add:	
Workmen's Compensation Board deposit interest	<u>154.25</u>
	\$ 5,895,796.03
Deduct:	
Workmen's Compensation Board interest remitted	<u>530.20</u>
Government of Canada and Government of the Province of Alberta equity as at March 31, 1972	<u>\$ 5,895,265.83</u>

The remuneration and expenses of members of the Board were paid by the Government of Canada and the Province of Alberta in accordance with the provisions of the Statute of the Board, Chapter 11, Statutes of Alberta, 1953.

The Province of Alberta, through the Minister of Forestry, has been incorporated into the Statement of Financial Operations.

Statement BEASTERN ROCKIES FOREST CONSERVATION BOARDSTATEMENT OF MAINTENANCE EXPENDITURE *FOR THE YEAR ENDED MARCH 31, 1972

Maintenance expenses:		
Salaries	\$ 729,421.08	
Wages	134,780.52	
Equipment and motor vehicle expense	114,079.83	
Rentals	41,064.12	
Maintenance, material and operation expense	28,510.49	
Heat, light and power	19,393.43	
Administration and general expense	14,309.38	
Travelling	7,933.72	
Freight, express and cartage	1,544.31	
Honorarium	1,000.00	
Telephone and telegraph	946.48	
Pensions	206.56	
Postage	179.53	
Advertising	25.00	
		\$ 1,093,394.45
Automobiles, trucks and mobile equipment		76,235.04
Furnishings, equipment and tools		3,814.79
		<u>\$ 1,173,444.28</u>
Provided by:		
Appropriations 1815, 1819 and 1821		<u>\$ 1,173,444.28</u>

* Note 3

This is the balance sheet referred to in my report of May 30, 1972, addressed to the Eastern Rockies Forest Conservation Board.

R. G. A.
Provincial Auditor

EASTERN ROCKIES FOREST CONSERVATION BOARDNOTES TO THE FINANCIAL STATEMENTSMARCH 31, 1972

Note 1 Total capital expenditures from inception to March 31, 1955, amounting to \$6,278,906.10 were made from funds provided by the Government of Canada (as authorized under Section 8(a) of the Memorandum of Agreement set forth in the Schedules to Chapter 59, Statutes of Canada, 1947, and Chapter 20, Statutes of Alberta, 1948, and amendment Acts, 1957) for the location and construction of forest improvements, the making of a forest inventory, reforestation, and such other works and services as the Board considered necessary in that area of the East Slope of the Rocky Mountains forming part of the watershed of the Saskatchewan River, as more definitely described in the Appendices to the Acts. The total expenditure was not to exceed \$6,300,000.00 during the seven years ended March 31, 1955.

Note 2 Section 20 of the Memorandum of Agreement provides that upon termination of the Agreement:

- (a) All improvements or works resulting from the carrying out of the programs of the Board shall belong to the Province.
- (b) All other property acquired by the Board shall belong to the Province.

Note 3 The total amount expended by the Board was provided by the Government of the Province of Alberta in accordance with Section 2(a)(ii) of the Memorandum of Agreement dated June 17, 1953, between the Government of Canada and the Government of the Province of Alberta as set forth in the Schedules to Chapter 41, Statutes of Canada, 1952, and Chapter 36, Statutes of Alberta, 1953.

The remuneration and expenses of members of the Board were paid by the Governments of Canada and the Province of Alberta in accordance with Section 2(b)(iii) of the Memorandum of Agreement. The amounts paid by the Province of Alberta, including the honorarium of \$1,000.00 to A. T. Baker, have been incorporated into the Statement of Maintenance Expenditure.

Appendix "C"
To E.R.F.C.B.
Annual Report 1971-72

Statement of Revenue from Surface
Rights within the Conservation Area
for the fiscal year 1971-72

Grazing Permits	\$ 70,568.99
Grazing Miscellaneous	259.60
Hay Permits	Nil
Right of Entry Leases	1,039.86
Miscellaneous Leases	1,536.31
Sundry Revenue	9,945.01
Timber Permits	2,449.34
Special Timber Permits	10,741.93
Timber Fees, Rental, etc.	18,384.80
Timber Dues	389,217.92
Timber Miscellaneous Revenue	4,361.54
	<hr/>
	\$508,505.30

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EASTERN ROCKIES FOREST
CONSERVATION BOARD
ANNUAL REPORT OF THE EASTERN
SERIAL M1 39721763 SCI



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1971/72

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CAMERON LIBRARY

Appendix "C"
To E.R.F.C.B.

from Surface ervation Area 1971-72

	\$ 70,568.99
	259.60
	Nil
	1,039.86
	1,536.31
	9,945.01
	2,449.34
	10,741.93
	18,384.80
	389,217.92
	4,361.54
	<hr/>
	\$508,505.30

\$508,505.30

of the Province of Alberta
The Memorandum of Agreement
between the Government of
Canada and the Gov-
ernment of the Province of
Alberta

B2